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GB A 2069250 GB 1492951 GB 1143347  
GB 1500722 GB 1339801 EP 0154412

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Selected US specifications from IPC sub-class H01R

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## (54) Electrical connector

(57) An electrical connector comprises male and female housings 11,13 each carrying a plurality of contacts 15 to be brought into engagement when the housings are coupled. The housings 11,13 carry cam surfaces 24,25 and cam followers 19 mounted on resilient arms 18 to latch the housings 11,13 together. These parts 24,19 present a positive resistance to engagement until the contacts 15 are in engagement so as to throw the housings apart if the engagement pressure is released prior to engagement of the contacts 15. In order to facilitate separation of the housings 11,13 to release the connection, the cam followers 19 may be manually releasable from the cam surface by squeezing the arms 18 inwardly.

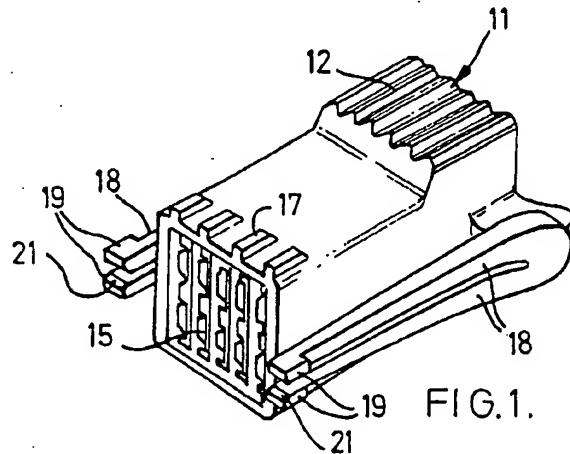
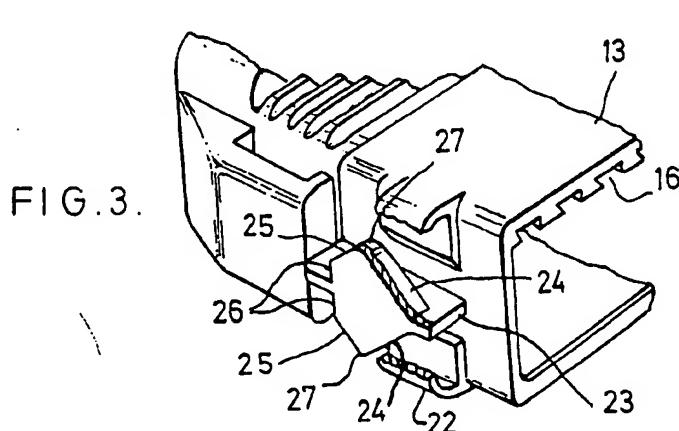


FIG. 1.



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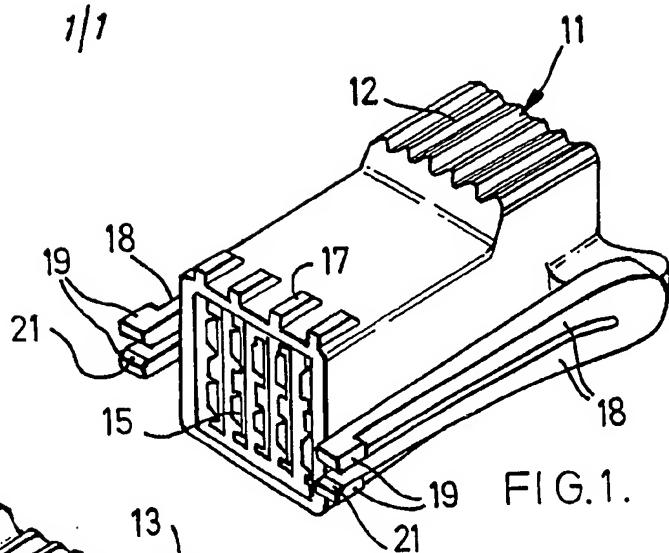


FIG. 1.

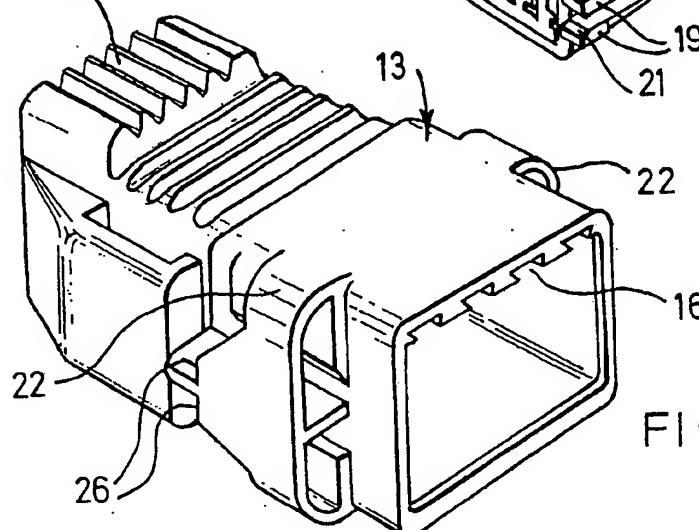


FIG. 2.

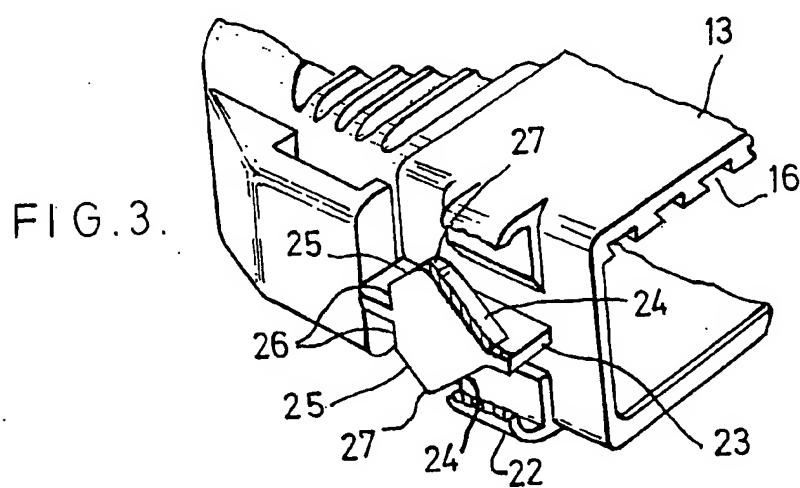


FIG. 3.

## SPECIFICATION

## Electrical connector

5 This invention relates to electrical connectors, and particularly to multiple contact cable connectors.

Such connectors comprise male and female housings each carrying a plurality of contacts 10 for connection to the cores of a cable, and the housings are arranged to be pressed and secured together to bring mating contacts into connection. The contacts may be male and female respectively, or hermaphroditic.

15 An example of such a connector is described in our application GB-A-2167611, which relates particularly to the contact modules, but does disclose some locking arrangements for securing the housings together.

20 In accordance with the present invention, there is provided an electrical connector comprising male and female housings each carrying a plurality of contacts to be brought into engagement when the housings are coupled, wherein the housings carry inter-engaging parts releasably to latch the housings together in the connected position, and in which the interengaging parts present a positive resistance to engagement until the contacts are in engagement so as to throw the housings apart if the engagement pressure is released prior to engagement of the contacts.

25 By this means, the connector does not stay mated unless the housings are fully pushed home and latched. The effect of this is that the user is made aware if the connection is not complete, and does not abandon the operation if the proper electrical connection is 30 not made.

35 In a preferred arrangement, one housing carries cam surfaces engageable with resilient cam follower parts on the other housing.

40 These cam surfaces conveniently comprise a 45 pair of divergent surfaces on each side of the said one housing, and the cam follower parts conveniently include cooperating pairs of arms resiliently urged together and arranged to engage the divergent surfaces so as to be 50 moved apart during engagement of the housings. The arms may have lateral extensions bearing on the cam surfaces and engaging on shoulders formed as extensions of the cam surfaces to latch the housings together.

55 The arms and cam surfaces are preferably integrally moulded with the respective housings.

60 In order to facilitate separation of the housings to release the connection, the cam follower parts may be manually releasable from the cam surfaces.

65 The invention will be further described with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a male

housing forming one component of a connection in accordance with a preferred form of the invention;

70 Figure 2 is a perspective view of a female housing matching the male housing of Fig. 1; and

Figure 3 is a view similar to part of Fig. 2, with parts cut away to show cam surfaces.

75 The connector illustrated in the drawings is generally as described in our published co-pending application GB-A-2167611, apart from the latching mechanism, and a detailed description of the contact arrangement is not deemed necessary.

80 Fig. 1 shows a male housing (plug) 11, with longitudinal flutes 12, forming guides for a contact carrier extraction tool, at the rear end thereof. The opposite (forward) end of the body is adapted to enter the open end of a 85 female housing (socket) 13 shown in Figs. 2 and 3. The female housing also has flutes 14 at its rear end to guide a contact carrier extraction tool. In addition, the female housing has transverse finger-gripping flutes for separation of the housings 11 and 13. Contacts 15

90 are discernible in the end of the housing 11, and are preferably hermaphroditic. The female housing is shown as having a series of grooves 16 matching with forward ribs 17 on 95 the male housing 11. The principal function of these is to provide a security coding to prevent mismatch of housings. This is achieved by blocking one or more of the grooves 16 and removing the matching ribs 17, so that

100 only a correctly coded male housing 11 may enter the female housing 13.

The housings 11 and 13 are each moulded in a suitable plastics material.

105 The male housing 11 is shown as having a pair of resilient latch arms 18 integrally moulded at each side thereof, and these arms end in lateral extensions 19 at their distal ends. The ends of the arms 18 and the extensions 19 are chamfered as shown at 21 to

110 provide a lead-in.

The female housing 13 has side extensions 22 (shown partly cut away in Fig. 3) which cover a keeper arrangement for the latch arms 18. This keeper arrangement comprises a

115 shelf 23 to guide and separate the arms 18 of each pair by means of the lead-ins 21. The inside wall of the extension is provided with a pair of divergent cam surfaces 24 (shown in Fig. 3) followed by a pair of convergent cam surfaces 25 terminating in shoulders 26.

120 In operation, as the housings are brought together, the chamfers 21 guide the ends of the arms onto opposite sides of the shelves 23. Subsequently, the extensions 19 act as

125 cam followers and ride on the divergent cam surfaces 24 to part the arms 18 against their inherent resilience, thus providing a palpable resistance to connection. If the connection is aborted during this phase, the resilience of the arms 18 will tend to throw the housings

apart, so that the operator will know that connection has not been completed. As the extensions 19 reach apices 27 between the respective surfaces 24 and 25, the contacts 15 in the housings 11 and 13 will move into engagement and significantly increase the resistance to further connection movement. This is to some extent compensated by the extensions 19 passing over the apices 27 onto the convergent surfaces 25 so that the resilience of the arms assists the connection movement. As connection is completed, the extensions 19 pass behind the shoulders 26 to complete the latching.

15 In order to facilitate disconnection, the inner surfaces of the arms 18 may be so far spaced from the outer wall of the housing 13 that they may be squeezed inwardly to clear the extensions 19 from the shoulders to enable a straight retraction of the arms 18 during disconnection.

It will be seen that there are four active members (the four arms 18) involved in the provision of the throw apart function, but that 25 the bulk of the connector is little if any increases over that of similar connectors without the throw apart function.

Various modifications may be made within the scope of the invention as set forth in the 30 appended claims.

#### CLAIMS

1. An electrical connector comprising male and female housings each carrying a plurality of contacts to be brought into engagement when the housings are coupled, wherein the housings carry interengaging parts releasably to latch the housings together in the connected position, and in which the interengaging parts present a positive resistance to engagement until the contacts are in engagement so as to throw the housings apart if the engagement pressure is released prior to engagement of the contacts.
2. A connector as claimed in claim 1, in which one housing carries cam surfaces engageable with resilient cam follower parts on the other housing.
3. A connector as claimed in claim 2, in which the cam surfaces comprise a pair of divergent surfaces on each side of the said one housing, and in which the cam follower parts include co-operating pairs of arms resiliently urged together and arranged to engage the divergent surfaces so as to be moved apart during engagement of the housings.
4. A connector as claimed in claim 3, in which the arms have lateral extensions bearing on the cam surfaces.
5. A connector as claimed in claim 4, in which the extensions engage on shoulders formed as extensions of the cam surfaces to latch the housings together.
6. A connector as claimed in claim 3, 4 or 5, in which the arms are integrally moulded

with the said other housing.

7. A connector as claimed in claim 3, 4, 5 or 6, in which the said divergent surfaces are integrally moulded with the said one housing.
8. A connector as claimed in any of claims 2 to 7, in which the cam follower parts are releasable from the cam surfaces to enable the housings to be separated.
9. An electrical connector substantially as 75 hereinbefore described with reference to the accompanying drawings.

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